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IN RE: The application of William P. Fell and William P. O'Hara

TITLE OF THE INVENTION

Jet Powered Steering System For Small Boat Outboard Motors

CROSS REFERENCE TO RELATED APPLICATIONS

Not Applicable

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH AND
DEVELOPMENT

Not Applicable

BACKGROUND OF THE INVENTION

1. Field of the invention

This invention relates to jet powered steering system for small boat outboard motors and particularly to jet powered steering system for small boats that steer without turning the outboard motor.

2. Description of the Prior Art

Outboard motors have been in use decades. These units have a small engine that is attached to a drive shaft, which in turn, drives a propeller or jet drive. The output of these motors propels the boat forward. To turn the boat, the user must guide the output of the motor to one side of the stern. This is typically accomplished in one of two ways. The first uses a tiller arm that is directly attached to the motor. This system is usually found on smaller motors. It has an extended handle, usually with a throttle grip attached. The motor is secured to the transom of the boat on a pivot that allows the

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1 motor to be rotated about the pivot. This is done by moving the tiller handle from side
2 to side. For larger boats, a steering wheel system is often used. The steering wheel is
3 typically located forward in the boat and is connected to the motor by cables. As the
4 steering wheel is turned, the steering wheel pulls the cables, which in turn, cause the
5 motor to pivot about its pivot, thereby steering the boat.

6 The problem with this system is that it requires the entire motor to move.
7 Besides the effort needed to move the motor, the amount the motor can turn is often
8 limited by the space behind the transom. Moreover, turning the motor from one side of
9 the boat to the other takes some time, especially for the steering wheel controls.

BRIEF DESCRIPTION OF THE INVENTION

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11 The instant invention overcomes this problem by creating a directional nozzle for
12 the jet output that is attached to a control cable system. This cable causes the directional
13 nozzle to turn, which causes the thrust of the jet output to turn the boat. Thus, the boat
14 can be steered without having to turn the entire motor. Two different mechanisms are
15 disclosed that enable the steering. The first is a tiller system that operates much like the
16 traditional tiller on an outboard motor. However, unlike those tillers, this tiller operates
17 the directional nozzle and does not turn the entire motor. The second mechanism is a
18 bicycle handlebar system that is placed forward of the motor, much like a traditional
19 wheel. The handlebar system, when combined with the new steering system, produces
20 faster steering response without the effort required to turn the wheel to make large
21 sweeping turns.

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1 The system has a substantial advantage over standard steering systems. First, is
2 speed of control. The boat turns much faster because the movement of the steering
3 control is minimized. Second, the operation of the boat is optimized because the motor
4 remains stationary, which helps maintain optimum water flow under the boat.

BRIEF DESCRIPTION OF THE DRAWINGS

5
6 Figure 1 is a detail view of the first embodiment of the invention, the jet pump
7 steering system.

8 Figure 2 is a side detail view of the jet pump steering system lower portion.

9 Figure 3 is a rear view of the jet pump steering system lower portion, in place on
10 a motor.

11 Figure 4 is a perspective detail view of the adapter ring frame of the jet pump
12 steering system.

13 Figure 5 is a perspective detail view of the directional nozzle of the jet pump
14 steering system.

15 Figure 6 is a perspective detail view of the reverse thrust cup of the jet pump
16 steering system.

17 Figure 7 is a perspective view of a handlebar steering control portion of the
18 system.

19 Figure 8 is a perspective detail view of the steering tiller for the new steering
20 system.

21 Figure 9 is a detail view of a portion of the fixed portion of the tiller arm.

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1 Figure 10 is a detail view of the movable portion of the tiller arm.

2 Figure 11 is a detail view of the underside of the fixed portion of the tiller arm.

3 Figure 12 is a detail view of the underside of the movable portion of the tiller

4 arm.

5 Figure 13 is a perspective view of another embodiment of the tiller arm.

6 Figure 14 is a bottom view of the embodiment of the tiller arm of figure 13.

7 DETAILED DESCRIPTION OF THE INVENTION

8 Referring now to fig. 1, a detail view of the invention, the jet pump steering (JPS)
9 system is shown. Figure 1 shows a portion of a boat **100** that has a transom **100a** on
10 which an outboard motor **101** is mounted. The motor **101** has a jet pump drive **102** (see
11 fig. 2) on its lower unit **101a**. The figure shows the JPS system **1** mounted to the lower
12 unit **101a** of the motor **101**. Control cables **2** and **3** are shown running from the JPS
13 system **1** to the control tiller **30**. Dashed lines **2a** and **3a** are shown running to the
14 optional handlebar steering system **40**. Both the control tiller and the handlebar
15 steering system are discussed in greater detail below.

16 Figure 2 is a side detail view of the JPS system **1**. Here, the lower unit **101a** of the
17 motor **101** is shown. The jet pump output **102** extends out from the back of the lower
18 unit **101a**. The JPS has three main parts. First, there is an adaptor ring **5** (see fig. 4).
19 Next, there is a directional nozzle **15** (see fig. 5) and then there is a reverse thrust cap **20**
20 (see fig. 6). When assembled, these components allow a user to steer a boat quickly and
21 easily. Cables **2** and **3** are shown attaching to the directional nozzle **15** and to the

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1 reverse thrust cap 20. These connections are described in detail below. The cables also
2 are held by bracket 4, which is secured to the lower unit 101a.

3 Figure 3 is a rear view of the JPS system lower portion, in place on a motor.
4 Here, the adaptor ring 5, the directional nozzle and reverse thrust cap are shown in
5 relation to the lower unit 101a of the motor. Note the positions of cables 2 and 3 in
6 making connections to the different components. Note also bracket 4, which is secured
7 to the lower unit 101a. This bracket holds the cables 2 and 3 in the proper position.

8 Figure 4 is a perspective detail view of the adapter ring frame of the JPS system.
9 The adaptor ring 5 is used to attach the directional components of the JPS to the lower
10 unit. The adapter ring 5 has two brackets 6 that connect the adapter ring to the lower
11 unit 101a. See fig. 2. The adapter ring 5 does not move after it is installed. Rather, it
12 acts as a means for attaching the movable components of the system to the motor. The
13 adapter ring 5 also has a bracket 7 that is used to secure the cable 2 as it feeds back to
14 the directional nozzle 15. Finally, the adapter ring 5 has two holes 8 that are used to
15 secure the directional nozzle 15, as discussed below.

16 Figure 5 is a perspective detail view of the directional nozzle of the JPS system.
17 The directional nozzle 15 has a tapered body to allow for maximum efficiency in the jet
18 flow. The directional nozzle 15 has two brackets 16 (see fig. 2) that secure it to the
19 adaptor ring 5 using bolts 17, or other common fasteners. A bracket 18 is formed on the
20 side of the directional nozzle 15 to which the cable 2 is attached. Two ears 19 extend out
21 of the top of the directional nozzle 15 as shown. These ears bolt the reverse thrust cap

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1 20 in place (see fig. 2). The directional nozzle 15 is designed to pivot side to side around
2 the adapter ring 5. By pulling or pushing the cable 2, the directional nozzle 15 moves
3 right or left. If this is done while the motor is operating, the movement of the
4 directional nozzle 15 will cause the boat to steer left or right while the motor remains
5 stationary.

6 Figure 6 is a perspective detail view of the reverse thrust cup 20 of the JPS
7 system. In a jet drive boat, there is no propeller to reverse to reverse the thrust of the
8 motor. Thus, the reverse thrust cup 20 is designed to move down over the output of the
9 directional nozzle 15, which causes the jet output to strike the reverse thrust cup 20,
10 which causes the boat to move in the reverse direction of normal thrust. The reverse
11 thrust cup 20 is a curved member that has a pair of brackets 21 (see fig. 3), which hook
12 over the ears 19 on the directional nozzle 15. This allows the reverse thrust cup 20 to
13 move in a vertical direction, up and down. The reverse thrust cup 20 is controlled by
14 the cable 3 (see fig. 2), which is secured to a bracket 22 that extends back from the
15 reverse thrust cup 20 as shown. This, if cable 3 is pulled, the reverse thrust cup 20 is
16 pulled up, which is the normal operating position. If cable 3 is pushed, the reverse
17 thrust cup 20 is moved down into the reverse position.

18 In the preferred embodiment, there are two types of controls disclosed. The
19 choice of control depends on a number of factors, including the size of the motor, the
20 size of the boat, and the personal preferences of the operator. It is also possible to have
21 both control systems installed and available for use on a single boat.

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1 Figure 7 is a perspective view of a handlebar steering control portion **30** of the
2 system. The handlebar steering control portion **30** consists of a support stand **31** that
3 holds the unit in a convenient position and height for the user. The control has a
4 handlebar portion **32** that is attached to a shaft **33**. The shaft extends down through the
5 support stand **31** until it connects to a horizontal connector **34**. The connector **34**
6 attached to cable **2** and to the shaft **33** such that as the shaft **33** is turned, it acts to pull or
7 push the cable **2**, which in turn, causes the directional nozzle **15** to turn, thereby steering
8 the boat. The shaft is secured within the support stand by brackets **35** as shown. Of
9 course, other means may be used in place of these brackets as well.

10 The reverse thrust handle **36** is attached to the support stand as shown. A lever
11 connects to the cable **3** and operates the reverse thrust cup **20** by moving the lever back
12 and forth. A speed control **37** can also be connected to the support stand as shown.
13 Moreover, the speed control can be incorporated into one of the handles **38** of the
14 handlebar **32**. In this case, the speed control operates as the speed control on a
15 motorcycle, or the tiller control, discussed below.

16 Ordinarily, the tiller is attached to the motor so that as the tiller is pushed from
17 side to side, the motor is turned. The steering tiller for the instant invention, however,
18 has a different structure. Figure 8 is a perspective detail view of the steering tiller for
19 the new steering system. In this system, the steering tiller **40** has a mounting arm **41**,
20 which is secured to the motor tiller mount **105**. At the front of the mounting arm **41** is
21 the steering control **42**. As discussed below, the steering control **42** is attached to the

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1 mounting arm by two brackets 43 located on the mounting arm and two brackets 44
2 that are attached to the steering control 42. The brackets 43 and 44 are secured by
3 fasteners 45. Linked in this way, the steering control is able to move back and forth
4 while the mounting arm 41 remains stationary. Two adjustable stops 46 are attached to
5 the steering control as shown. These stops limit the side-to-side movement of the
6 steering control to a preferred range of 45 degrees of movement on each side of the
7 centerline of the mounting arm. The stops are adjustable so that this angle can be set
8 within a narrow range. A lever 47 is attached to the steering control as shown. Control
9 cable 2 is attached to the lever 47. Now, as the steering control is moved from side to
10 side, cable 2 causes the directional nozzle 15 to move from side to side. In this way, the
11 boat can be steered using the tiller in much the same fashion as a standard tiller.

12 Throttle control is obtained by a universal joint 48, which allows the throttle
13 mechanism to turn regardless of the position of the steering control 42.

14 In this embodiment, the reverse mechanism is handled by a lever attached to the
15 motor, in much the same way as a normal reverse lever is used. Here, however, the
16 reverse lever is connected to cable 3, which operates the reverse thrust cup 20. A cable
17 stabilizer bracket 49 may be attached to the mounting arm 41 to support the cable 3 in a
18 non-obstructive position.

19 Figure 9 is a detail view of a portion of the mounting arm 41. Here, the brackets
20 43 are shown as well as one-half of the universal joint 48. The cable stabilizer bracket 49
21 is also shown.

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1 Figure 10 is a detail view of the steering control 42. This view shows the two
2 brackets 44 that are attached to the steering control 42, as well as the lever 47, which is
3 attached to the steering control as shown. This view also shows the other half of the
4 universal joint 48.

5 Figure 11 is a detail view of the underside of the mounting arm 41. Note that a
6 bearing 50 is installed on the underside of the arm to support the shaft 51 from the
7 universal joint 48. Note that only one of the brackets 43 is shown in this view to allow
8 the bearing 50 to be seen.

9 Figure 12 is a detail view of the underside of the steering control 42. As in figure
10 11, only one bracket 44 is shown. This allows the bearing 52 to be seen. This bearing
11 supports the shaft 53 extending from the universal joint.

12 Figure 13 is a perspective view of the modified tiller arm. In this view, the cable
13 2 is shown connecting to the lever 47. The cable 2 is also shown passing through
14 another type of cable stabilizer bracket 49.

15 Figure 14 is a bottom view of the embodiment of the tiller arm of figure 13. This
16 view shows the lever 47 and the universal joint 48 and the shafts 51 and 52.

17 In normal operation, the device is operated much like a traditional steering
18 system for a boat. In the case of the tiller, the operator holds the end of the tiller in the
19 same manner as one would use a standard outboard motor tiller. The throttle is
20 connected to the handgrip and is operated by twisting the handgrip. The boat is steered
21 by moving the end of the tiller back and forth in a horizontal plane. Unlike the

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1 standard tiller, which when moved causes the entire motor to turn; the tiller of the
2 instant invention causes the directional nozzle to move back and forth, which causes the
3 boat to turn without moving the motor. In the case of the handlebar steering, turning
4 the handlebars causes the cable to move the directional nozzle, thereby turning the boat.
5 Again, the motor is not moved and the turning action does not require many rotations
6 of a steering wheel.

7 The present disclosure should not be construed in any limited sense other than
8 that limited by the scope of the claims having regard to the teachings herein and the
9 prior art being apparent with the preferred form of the invention disclosed herein and
10 which reveals details of structure of a preferred form necessary for a better
11 understanding of the invention and may be subject to change by skilled persons within
12 the scope of the invention without departing from the concept thereof.